

***Leptecophylla*, a New Genus for Species Formerly Included in *Cyathodes* (Epacridaceae)**

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Abstract

The genus *Leptecophylla* C.M.Weiller is proposed to include 12 species, previously included in *Cyathodes* Labill., occurring in Australia, New Zealand, and several Pacific Island groups and for one species in New Guinea previously included in *Styphelia* Sm. New combinations made are: *L. divaricata* (J.D.Hook.) C.M.Weiller, *L. pseudulosa* (S.J. Jarman) C.M.Weiller, *L. abietina* (Labill.) C.M.Weiller, *L. juniperina* (J.R.Forst. & G.Forst.) C.M.Weiller, *L. robusta* (J.D.Hook.) C.M.Weiller, *L. brassii* (Sleum.) C.M.Weiller, *L. imbricata* (Stschegl.) C.M.Weiller, *L. tanniaeinae* (Cham. & Schtdl.) C.M.Weiller, *L. rapae* (Sleum.) C.M.Weiller, *L. brevistyla* (J.W.Moore) C.M.Weiller, *L. pomarae* (A.Gray) C.M.Weiller, and *L. mariannensis* (Kaneh.) C.M.Weiller. One new species, *L. pogonocalyx* C.M.Weiller, is described and three subspecies within *L. juniperina* are recognised. A key and descriptions are provided for the Australian and New Zealand species.

Introduction

The genus *Leptecophylla* is described to include 12 species formerly included in *Cyathodes* and one in *Styphelia*. These species were referred to as the ‘*juniperina* group’ in a paper reassessing the generic limits of *Cyathodes* Labill. (Weiller 1996). Leaf arrangement and morphology and flower morphology provide the main characters distinguishing *Leptecophylla* from *Cyathodes* s. str. In *Leptecophylla* the leaves are alternate, usually small and pungent-tipped and have an appressed petiole; the flowers have short spreading corolla lobes and included or half-exserted anthers attached to filiform filaments, and the ovary is typically 5-celled; all species are apparently functionally dioecious. In *Cyathodes* s. str. the leaves occur in pseudowhorls and are longer and broader with a blunt tip and spreading petiole; the flowers have long, revolute corolla lobes and anthers fully exserted on thick filaments, the ovary is usually 6–10-celled and all species are hermaphrodite (see Table 1, Weiller 1996).

The relationships of *Leptecophylla* to other genera in the tribe Styphelieae are not resolved in recent morphological analyses (Powell *et al.* 1997) and results from molecular work for the tribe are not yet published. It is worth noting that of the species included in the *Cyathodes* A group of Powell *et al.* (1997), two belong to *Cyathodes* s. str. (*C. glauca* and *C. straminea*) and the rest to *Leptecophylla*. However the data matrix presented in Table 2 of the paper is applicable to *Leptecophylla* as notable features of *Cyathodes* s. str. are not scored as present, *viz.* long filaments with fully exserted anthers (character 7), filaments thick and tapering (11), and distinctly revolute corolla lobes (30).

Materials

This study is based on herbarium material at AK, BISH, BM, CANB, CBG, CHR, HO, K, MEL, NSW and WELT and field collections of all Australian species and focuses predominantly on the Australian and New Zealand species of the genus. All types and collections cited have been seen unless otherwise indicated. Photos of types from BM and FI will be lodged at HO.

Taxonomy

Leptecophylla C.M.Weiller, *gen. nov.*

Folia alterna, parallelinervia, subtus glauca. Flores solitarii axillares, bracteolis subtendis multis et bracteis binatis carinatis basi. Sepala 5. Corolla quinqueloba; lobi patentes, aestivione valvata. Stamina 5, in fauce corollae inserta. Ovarium 5–7 loculare. Nectarium annulare vel lobatum. Drupa subsphaerica.

Type species: Leptecophylla juniperina (J.R.Forst & G.Forst.) C.M.Weiller

Epacris J.R.Forst. & G.Forst., *p.p.* in: Char. gen. pl. 19 (1776); G.Forst., Fl. ins. austr. 13 (1786).

Ardisia Gaertn., Fruct. 2: 78, t. 94 fig. 2 (1791), *p.p.*, *nom. illeg.* non Sw. (1788).

Styphelia Sm., *p.p.* in: Labill., Nov. Holl. pl. 1: 48–49, t. 68–69 (1805); Poir., Encycl. 7: 482 (1806); Spreng., Syst. veg. 1: 654–659 (1824) (no generic description); F.Muell., Fragm. 6: 50 (1867); F.Muell., Fragm. 8: 54 (1873).

Cyathodes Labill., *p.p.* in: R.Br., Prodr. 539 (1810); Roem. & Schult., Syst. veg. 4: 41–42 (1819); G.Don, Gen. hist. 3: 776 (1834); DC., Prodr. 7: 740 (1839); J.D.Hook., Fl. nov.-zel. 1: 163 (1853); J.D.Hook., Fl. Tasman. 244, t. 74 (1857); J.D.Hook., Handb. N. Zeal. fl. 176 (1864); Benth., Fl. austr. 4: 167 (1868); Benth. & J.D.Hook., Gen. pl. 2: 612 (1876); Rodway, Tasman. fl. 113 (1903); Cheeseman, Man. New Zealand fl. 410 (1906); Cheeseman, Man. New Zealand fl. 694 (1925); Allan, Fl. New Zealand 1: 514 (1961); W.M.Curtis, Stud. Fl. Tasman. 2: 425 (1963). *Styphelia* subg. *Cyathodes* (Labill.) Drude, *p.p.*: in Engl. & Prantl., Nat. Pflanzenfam. 4, 1: 78 (1889); Sleumer, Blumea 12: 155 (1963).

Lissanthe R.Br., *p.p.*: in Spreng., Syst. veg. 1: 659 (1824) (no generic description).

Trochocarpa R.Br., *p.p.*: in Spreng., Syst. veg. 1: 660 (1824) (no generic description).

Low or erect usually compact *shrubs* to 2 m high, rarely a tree 6 m high. *Stems* glabrous, normally devoid of leaves, and with a rough, scaly, grey to brown bark. *Leaves* alternate, spreading or suberect, the lower surface glaucous and striate, the tip usually pungent. *Inflorescence* terminal and axillary. *Flowers* effectively unisexual (the plants dioecious), solitary in the leaf axils, subtended by paired, keeled bracts and numerous usually closely imbricate bracteoles, these cream to green, usually glabrous, and broadly ovate with a rounded obtuse apex. *Sepals* 5. Bracteole and sepal margins ciliolate. *Corolla* pentamerous, cream; *tube* campanulate or sub-urceolate, exceeding or about equalling the calyx, glabrous or pubescent inside; *lobes* valvate in bud, narrowly triangular, spreading, internally glabrous, with a few scattered hairs, or densely bearded. *Stamens* 5, alternating with the corolla lobes; *filaments* inserted at the top of the tube, short, the anther partially enclosed in the tube; *anthers* attached near the apex, linear. *Ovary* 5–7 celled with one ovule per cell; *style* attenuate from the ovary or inserted in a depression at the apex, short with the stigma at or below anther-level, or long with a conspicuous bend near the middle and the stigma exerted (*L. divaricata* and *L. pendulosa*), hollow with a pentaradiate canal and minutely papillose surface; *stigma* small, capitate or lobed; *nectary* annular and lobed and toothed. *Fruit* a red, pink or white drupe, usually more or less spherical, the apex slightly flattened; the mesocarp thick and pulpy, the endocarp hard and bony; calyx and style persistent; retained on the plant into the next flowering season.

Distribution: Tasmania and Victoria in south-east Australia, New Zealand, Papua New Guinea and several Pacific Island groups.

Etymology: The name *Leptecophylla* has been arbitrarily formed from the Greek *lepteces*, fine-pointed and *phyllum*, leaf, alluding to the fine, pungent tip on the leaves of most species.

Notes: Indumentum: Young stems are either puberulent with sparse, short, white, hairs (*L. juniperina*, *L. divaricata*) or pubescent with dense, long, silky, white hairs (*L. pendulosa*). The adaxial leaf surface is either glabrous or has short hairs at the base of the leaf, occasionally extending up the midline. The abaxial leaf surface appears glabrous

in all species except *L. abietina*, which has short hairs lining shallow intervenal grooves (Fig. 1a). In the other species, papillae clearly visible only with SEM and in transverse section, cover the intervenal regions obscuring the stomata (Fig. 1b). The petiole is glabrous or has short hairs on the upper surface. In the majority of species the leaf margin is glabrous or shortly ciliolate only toward the apex, but in three species, *L. pendulosa*, *L. divaricata* and *L. imbricata*, it is usually entirely ciliolate.

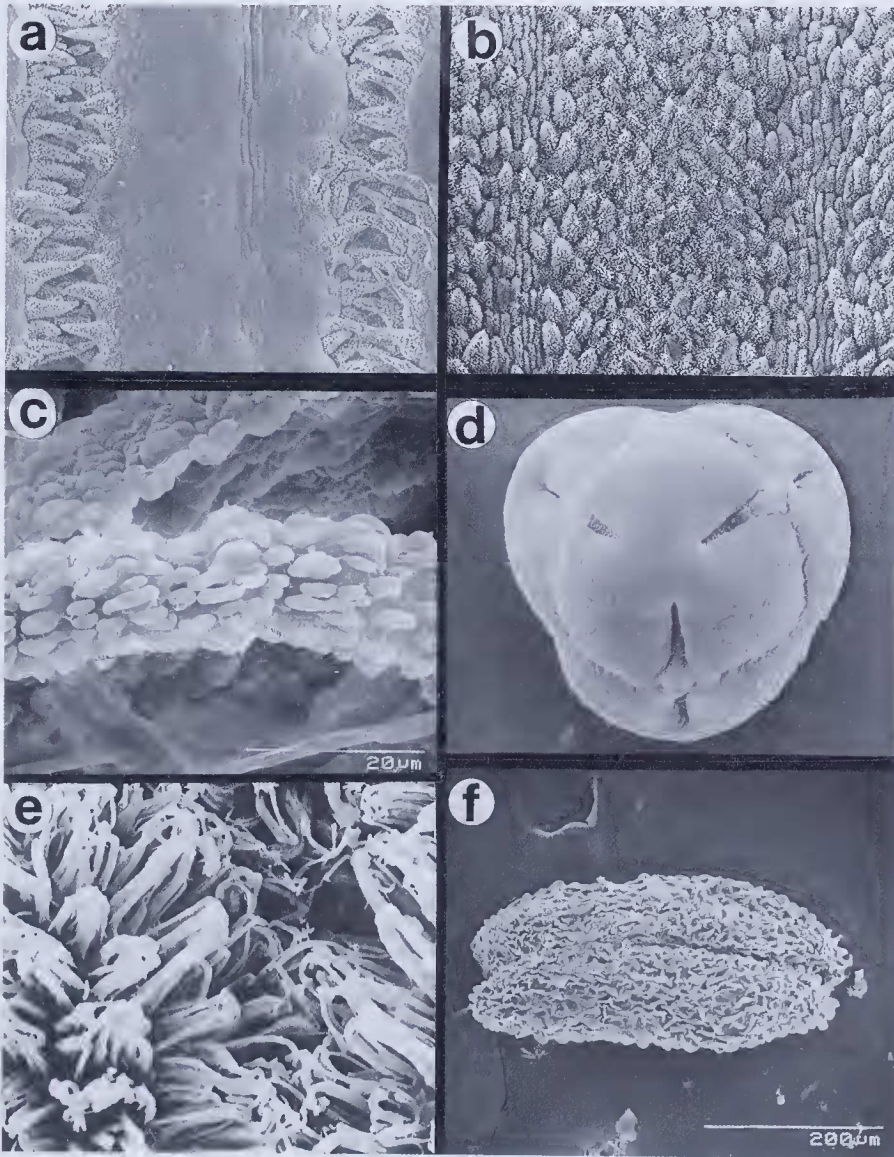


Fig. 1. **a** Short trichomes coated in ribbon wax and lining intervenal grooves in *L. abietina*, R.K. Crowden 8410-06. Scale bar = 0.1 mm; **b** Intervenal papillae and veinal areas covered in ribbon wax in *L. juniperina* subsp. *juniperina*, R.K. Crowden 8301-04. Scale bar = 0.1 mm; **c** Corolla lobe hair from *L. abietina*, R.K. Crowden 8410-06; **d** Polar view of pollen tetrad of *L. juniperina* subsp. *parvifolia*, C.M. Mihaich 7; **e** Ribbon wax of *L. juniperina* subsp. *juniperina*, R.K. Crowden 8301-04. Scale bar = 10 µm; **f** Aborted (female) anther of *L. divaricata*, F.H. Long 366.

Corolla hairs, when present, are usually confined to the inner surface where they vary in length, distribution, density and appearance. Scattered, translucent hairs regularly occur in *L. divaricata* and occasionally in *L. jimiperina*, and are flattened with occasional, small, linear tubercles. The dense, white, woolly lobe hairs of *L. abietina* are rounder and the surface sculpturing more prominent (Fig. 1e).

Leaves and bracts: The simple leaves are alternate, separated by short internodes, and in most species the petiole is appressed to the stem. The lamina are usually spreading, although erect in *L. imbricata*, or rarely reflexed, entire, oblong to ovate and 2.5–20 mm long and flat or slightly convex with the margin sometimes recurved. The leaves are homoblastic, although occasionally the first-formed leaves tend to be obovate and the margin of the distal part of the leaf hyaline or scarious. The leaves of most species have a pungent tip although in several the tip is a callus or mucro. The upper surface of the blade is green, the lower surface glaucous and striate with equally prominent parallel veins. The marginal veins in the upper half of the leaf are occasionally secondarily branched, the branching is particularly evident in broader leaved forms of *L. tameiameiae*.

The bracts enclosing the vegetative shoots are sometimes retained but are inconspicuous and may be observed at the base of the branchlets.

Pollen: The pollen of a number of species has been examined (Smith-White 1955, Venkata-Rao 1961, Franks and Watson 1963, McGlone 1978; all as *Cyathodes*). Smith-White described two pollen types in *Cyathodes*: 'S' or monad in which only one grain of the tetrad develops (*L. jimiperina* subsp. *parvifolia*) and 'T' or tetrad type (*L. imbricata* and *L. tameiameiae*). McGlone modified the categories and reclassified several species as the segregating tetrad type ('A'). It is probable that the A-type is more widespread as *L. divaricata* and *L. jimiperina* (Fig. 1d), previously reported as T-type (Venkata-Rao 1961) or S-type (Smith-White 1955), were found to form tetrads varying in the number of viable grains from 0 to 4 (Weiller, unpublished data).

Leaf Anatomy: The leaves of the majority of species are characterised by a thick adaxial cuticle (12–25 μm) overlying large usually heavily lignified epidermal cells. In *L. pendulosa* it is only 5 μm thick. The abaxial cuticle is usually much thinner in many species (2.5–10 μm) and the epidermal cells small and only slightly lignified. Cuticularised papillae or unicellular trichomes are differentiated by the intervenal epidermal cells in all species.

The stomates are found only on the abaxial lamina surface and have been recorded on the adaxial sepal surface in *L. robusta*, *L. jimiperina* subsp. *parvifolia* and *L. tameiameiae* (Watson 1962, all as *Cyathodes*). They occur in distinct intervenal bands with the longitudinal axis aligned parallel with the leaf margin and are positioned level with or slightly above neighbouring epidermal cells. The stomatal arrangement is anomocytic (Watson 1967).

Palisade mesophyll occurs in 1–4 layers depending on the species. The proportion of spongy mesophyll also varies between species and may be open with large intercellular air spaces or tightly packed.

An arc of fibres supports the vascular bundle usually only on the abaxial side although occasional lignified cells are present on the adaxial side of the bundle. A row of parenchyma cells occurs between the abaxial fibre arc and the phloem in most species although occasional lignified cells are present in several. Between the fibres and the abaxial epidermis there is a layer of cells, occasionally lignified, consistent with the "endodermal cells" reported in *Acrotliche* (Paterson 1962).

Phytochemical Data: The leaves in all species have a dense covering of erect ribbons (Fig. 1c) either covering the entire abaxial surface or confined to short trichomes in the stomatal regions (Weiller *et al.* 1994). Wax composition is dominated by triterpenes and *n*-alkanes and is reported from earlier studies (Mihaiich 1989). The distribution of

anthocyanins in three species, *L. abietina*, *L. divaricata* and *L. juniperina* has been reported (Jarman 1975; Jarman and Crowden 1971, 1973, 1974; all as *Cyathodes*). Cyanidin-3-galactoside and cyanidin-3-arabinoside are both widespread within the species surveyed and indeed across the whole family. In *Leptecophylla* cyanidin-3-galactoside is the dominant pigment in all organs of the species examined. Work on leaf flavonoid bisulphate distribution is being undertaken by Dr. R.K. Crowden who has made relevant data available to me; the compounds are reported here as A and B.

Breeding System: All of the nine species examined in detail are 'functionally dioecious'. The term 'functionally dioecious' is used to refer to those species producing apparently hermaphrodite and male-sterile flowers on separate plants with only male-sterile flowers setting fruit; apparently functional gynoecea are present in 'hermaphrodite' flowers. In male-sterile plants the anthers (Fig. 1f) abort early in development, are very much reduced in size and barren of pollen.

Fruit on 'hermaphrodite' plants is rare and usually small and malformed in comparison to fruit produced on male-sterile plants. Preliminary *in vitro* and field pollination studies indicate that this floral form is self-sterile, and that a prezygotic incompatibility mechanism operates following selfing or cross pollination (Mihaich 1989). Functionally 'male' and male-sterile plants occur in approximately equal proportions in a population and, as with many other species exhibiting dioecy, the floral phenotypes differ in size with the 'male' flowers conspicuously larger. Protandry occurs in all species examined.

Pollinators are unknown for most species although numerous types of insects have been observed visiting the flowers of several species and the flower type, size, colour and structure is generally consistent with insect pollinated species (Faegri and Pijl 1979). A recent study however has shown *L. divaricata* to be ornithophilous (Higham 1994).

Species relationships

Five of the Australian and New Zealand species (*L. juniperina*, *L. pogonocalyx*, *L. pendulosa*, *L. divaricata* and *L. robusta*) form a natural grouping based on similarities of morphology and chemistry. *L. abietina* has the floral type and wax chemistry of the former species but lacks flavonoid bisulphates and exhibits a different wax distribution, with the ribbon wax confined to the stomatal regions. Phytochemical data for the New Guinea and Pacific island species has not been determined. Morphologically *L. brassii* and *L. rapae* appear closest to the Australian and New Zealand species.

Key to Australian and New Zealand species

1. Leaves sub-erect to spreading, tip short, blunt, veins > 52
 2. Leaf flat; corolla tube 4–4.5 mm long, > calyx, densely pubescent ..6. *L. abietina*
 2. Leaf margin recurved; corolla tube 1.7–2 mm long, ≈ calyx, glabrous...5. *L. robusta*
1. Leaves spreading, tip pungent; veins 3–73
 3. Style inserted in a depression at the apex of the ovary.....4
 4. Corolla with long hairs inside, tube > 5.5 mm; leaves 9–12 mm long, margin recurved3. *L. divaricata*
 4. Corolla glabrous, tube < 4.5 mm long; leaves 3.8–8 mm long; margin flat or slightly recurved4. *L. pendulosa*
 3. Style attenuate from the apex of the ovary5
 5. Corolla glabrous or sparsely hairy, > calyx; calyx glabrous; leaf margin flat or recurved1. *L. juniperina*
 5. Corolla glabrous, < or = calyx; calyx puberulent; leaf margin flat2. *L. pogonocalyx*

1. *Leptecophylla juniperina* (J.R. Forst. & G. Forst.) C.M. Weiller, *comb. nov.* *Epacris juniperina* J.R. Forst. & G. Forst., Char. gen. pl. 20, t. 10 (1776). *Type citation*: locality not designated, *Forster*. *Type*: not designated [New Zealand], part of G. Forster's Herbarium, *Forster* (lectotype here designated, BM). Two sheets, both Forster collections, are housed at BM. The material selected as the lectotype is mounted on a sheet bearing three handwritten labels – 'G. Forsters Herbarium', '71 *juniperina*' and 'β 126 *Stiphelia juniperina*'. Two specimens are on the sheet, the one on the right-hand side bears a single flower, the other is vegetative. The second sheet at BM with a single vegetative specimen comes from the Pallas Herbarium and has the labels – 'Herb. Pallas' and '*Stiphelia juniperina* a Col. Forster.' No locality information is present on the sheets or in the protologue, however subsequent authors such as Willdenow (1798) cite New Zealand. No Forster collections for the species were seen at K, although it is possible that specimens exist in other European herbaria such as LE and W. *Stiphelia juniperina* (J.R. Forst. & G. Forst.) Willd., Sp. pl. 1: 836 (1798). *Cyathodes juniperina* (J.R. Forst. & G. Forst.) Druce, Rep. Bot. Exch. Cl. Brit. Isles suppl. 2: 618 (1917). *Cyathodes juniperina* (J.R. Forst. & G. Forst.) var. *juniperina* Allan, Fl. New Zealand 1: 516 (1961).

Epacris juniperina sensu L. f., Suppl. pl. 138 (1782); G. Forst., Fl. ins. austr. 13 (1786). *Stiphelia juniperina sensu* Pers., Syn. pl. 1: 174 (1805); Poir., Encycl. 7: 488 (1806). *Cyathodes juniperina sensu* W.M. Curtis, Stud. Fl. Tasman. 2: 427 (1963); Willis, Handb. Pl. Viet. 2: 508 (1973).

Dioecious, compact or tall *shrubs* 40–200 cm high, rarely *trees* to 6 m. *Stems* grey, brown or grey-brown; *branchlets* usually brown but occasionally yellow-brown or red-brown, rounded, scabrous or puberulent. *Leaves* spreading or occasionally reflexed, narrowly ovate, 4.2–18 mm long, 1.1–2.5 mm wide, apex acute, tip pungent 0.4–1.6 mm long; margin flat or recurved, glabrous or ciliolate only toward the apex; upper surface glabrous or puberulent at base, lower surface with interveinal papillae and 3–7 veins; *petiole* erect, 0.6–1.7 mm long, appressed to stem, glabrous or puberulent on the upper surface. *Flowers* solitary, terminal and axillary on erect or recurved pedicels 2–5 mm long (male), 1.3–3 mm long (female); *bracts* ovate, 0.5–0.9 mm long, 0.6–1(–1.4) mm wide, obtuse, glabrous, margin usually ciliolate at apex; *bracteoles* and *sepals* ovate or elliptic, obtuse, glabrous; bracteoles 8–24 per flower, imbricate, 1.2–2.4 mm long, 1.1–2 mm wide; sepals 1.7–3.1 mm long, 1.1–2.3 mm wide. *Corolla tube* campanulate, exceeding the calyx, 2.1–4.4 mm long (male), 1.6–2.8 mm long (female), glabrous or with short, sparse hairs inside; *lobes* shorter than tube, 1.1–2.3 mm long, apex acute, glabrous or with short, sparse hairs. *Anthers* of male flowers 1.1–2 mm long, half-exserted; *filaments* 0.2–0.5 mm long, slightly exserted and visible between the lobes. *Ovary* more or less spherical 0.5–1 mm high, 0.6–1.3 mm wide, glabrous, (4–)5(–6) celled; *style* straight, glabrous, attenuate from the ovary, 1–1.8 mm long (male), 0.9–1.5 mm long (female); *stigma* 0.1–0.2 mm high; *nectary* 0.3–0.7 mm high, of distinct scales or weakly adherent scales separating with pressure, margin toothed or rounded and occasionally with hairs. *Drupe* white or pale to dark pink, slightly flattened sphere 4–7 mm high, 5–9 mm wide, 1–5 locules with ovules developing into seeds.

Distribution and Habitat: Widespread and variable species occurring throughout Tasmania, the Bass Strait Islands, the southern coastal regions of Victoria and throughout New Zealand, from extreme coastal to sub-alpine habitats (Figs. 2, 3).

Leaf Anatomy: The leaf is 330–370 µm thick although thicker in *L. juniperinum* subsp. *oxycedrus* (450–550 µm) with the adaxial cuticle 10–15 µm and the abaxial cuticle 2.5–5 µm thick. Rounded papillae occur in the stomatal regions. Adaxial epidermal cells heavily lignified, 32.5–40 µm long, 17.5–25 µm wide; abaxial cells narrowly lignified, small, 12.5–17.5 µm long, 8–15 µm wide. Two to three rows of elongate palisade mesophyll cells 80–95 µm long, 15–20 µm wide (or c. 122 µm long and 17 µm wide in subsp. *oxycedrus*) are associated with a compact spongy mesophyll of rounded cells.

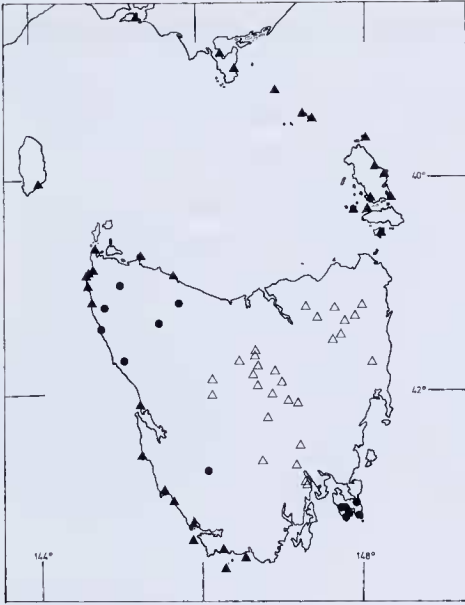


Fig. 2. Australian distribution of *Leptecophylla juniperina* subsp. *juniperina* ●, *L. juniperina* subsp. *parvifolia* △, and *L. juniperina* subsp. *oxycedrus* ▲.



Fig. 3. New Zealand distribution of *Leptecophylla juniperina* subsp. *juniperina*.

Fibres form an arc beneath the vascular bundle and a few fibre cells may also be present on the adaxial side. Endodermal cells usually remain unthickened.

Chemical Data: Ribbon wax covers the abaxial lamina and is composed mainly of triterpenes (70–76%) and alkanes (5–10%). Triterpenes β -amyrenone, α -amyrenone, α -amyrin, F and F1 are consistently present.

Notes: *Leptecophylla juniperina* is taxonomically the most difficult taxon in the genus due to sympatry of several closely related species, a relatively wide geographic distribution (Tasmania, Victoria and New Zealand), and a somewhat confused nomenclature.

In Australia three morphological entities have generally been recognised within what may be termed the “*juniperina* complex”. By implication Hooker (1860) includes *C. juniperina* under *C. oxycedrus*, as does Mueller (1868), and distinguishes it from *C. parvifolia* on size of the shrub, leaf and corolla. Bentham (1868) conversely includes *C. oxycedrus* under *C. acerosa*, as does Rodway (1903), and gives the distribution as coastal Victoria, coastal areas of Tasmania and “other parts of the island” and New Zealand. Curtis (1963) is the first to use the name *Cyathodes juniperina* in the Australian literature and places both *C. oxycedrus* (Labill.) R.Br. and “*C. acerosa* auct. non *Ardisia acerosa* Gaertn.” in synonymy. Willis (1973) follows this treatment and in a note equates the “Australian [presumably coastal Victorian] and southern New Zealand populations to the var. *oxycedrus* ...” distinguished by longer, wider leaves with longer pungent tips. The Australian literature includes *C. parvifolia* as a distinct species. In his treatment for the Chatham Islands Mueller (1864) includes *C. parvifolia*, *C. oxycedrus* and *C. divaricata* under *C. acerosa* (= *C. juniperina*).

Floristic treatments in New Zealand have generally recognized *Cyathodes acerosa* (Gaertn.) Roem. and *Cyathodes acerosa* var. *oxycedrus* (Labill.) Cheeseman (Kirk 1889; Cheeseman 1906, 1925; Allan 1961).

Examination of numerous specimens shows a coastal form restricted to Australia. This taxon corresponds to the protologue for *Styphelia oxycedrus* Labill. None of the New Zealand material that I have seen corresponds to the Australian coastal form which is distinguished by the short sparse hairs inside the corolla, and broader 5–7 nerved leaves – features described by Labillardière but neglected by subsequent authors who have placed emphasis on the unbranched leaf veins to differentiate it.

This treatment circumscribes *Leptecophylla juniperina* as a variable and widespread species ranging from coastal to highland areas of Tasmania and New Zealand and the southern coastal region of Victoria. *Cyathodes parvifolia* R. Br. and the coastal form *C. oxycedrus* (Labill.) R.Br. are given subspecific rank within *L. juniperina*. All three forms occur in Tasmania. The New Zealand material is much more uniform overall, varying mainly in lamina length and width, tip length, and distribution and length of marginal hairs. Broader leafed specimens exhibit a greater frequency in branching of the outer veins toward the margin in the upper portion of the leaf. There also seems to be a greater prevalence of white-fruited plants in New Zealand. The occurrence of these characters is variable across the material examined and does not appear to warrant taxonomic distinction; only subsp. *juniperina* is recognised in New Zealand.

The subspecies are distinguished as follows:

Subspecies *juniperina* forms a shrub or tree up to 6 m tall, the leaves are variable in length ranging from 4–18 mm and are usually narrow, with a flat or slightly recurved usually glabrous margin. The corolla is glabrous, the tube is usually longer than the calyx or, in New Zealand material particularly, approximately equal to it.

Subspecies *parvifolia* is the highland form common on the Central Plateau, east and south-east regions of Tasmania. It is most similar to subsp. *juniperina* from which it differs in shrub and leaf size and a greater tendency to recurvature of the leaf margin. Floral characters are identical for the two forms.

Subspecies *oxycedrus* represents the coastal form of the south-east, west, north-west and Bass Strait islands of Tasmania, and the southern coastal region of Victoria. It is distinguished by the low, compact, rigid, windswept shrub; broader leaves and the regular presence of sparse, stiff hairs on the internal surface of the corolla. The corolla tube is longer than the calyx.

Chemical features of the leaf wax data also correlates with the morphological data. The wax chemistry of subsp. *juniperina* and subsp. *parvifolia* is identical in the components present and only slight quantitative differences are apparent, consistent with the intra-specific variation expected in such a wide ranging species (Mihaich 1989). *Leptecophylla juniperina* subsp. *oxycedrus* is also very similar, distinguished by the presence of primary alcohols in the wax which places it with *L. robusta*, previously considered a form of *L. juniperina* by Hooker (1853).

The distribution of flavonoid components shows a different relationship between the morphological forms. Two flavonoid bisulphates are present in leaf material from plants of subsp. *juniperina* and subsp. *oxycedrus* but only one consistently occurs in subsp. *parvifolia*.

Key to subspecies

1. Corolla with sparse, rigid hairs; leaves 1.5–2.5 mm broad, veins 5–7c. subsp. *oxycedrus*
1. Corolla glabrous; leaves 1–2.1 mm broad, veins 3–52
 2. Leaves 4.2–5.8 mm long, margin recurved, veins 3(–5).....b. subsp. *parvifolia*
 2. Leaves 4–18 mm long, margin flat, veins 5.....a. subsp. *juniperina*

Leptecophylla juniperina subsp. *juniperina*. Type indicated above under *Leptecophylla juniperina*.

Ardisia acerosa Gaertn., Fruct. 2: 78, t. 94 (1790). Type citation: In insula van Diemen. *Cyathodes acerosa* (Gaertn.) Roem. & Schult., Syst. veg. 4: 473 (1819). *Lissanthe acerosa* (Gaertn.) Spreng., Syst. veg. 1: 660 (1824). *Styphelia acerosa* F.Muell., Fragm. 8: 54 (1873).

Leucopogon forsteri A.Rich., Voy. Astrolabe 216 (1832), *nom. illeg.*, as *Epacris juniperina* J.R.Forst. & G.Forst. is cited in synonymy.

Cyathodes acerosa var. *parvifolia* J.D.Hook., Fl. Nov.-zel. 1: 163 (1853). Type citation: Port Nicholson, Taupo Lake, etc., Colenso, etc.: Middle Island, Lyall; all *n.v.*

Cyathodes acerosa sensu G.Don, Gen. hist. 3: 776 (1834); A.Cunn., Ann. Nat. Hist. ser. 1, 2: 47 (1839); DC., Prodr. 7: 741 (1839); F.L.Raoul, Choix pl. Nouv.-Zél. 44 (1846); J.D.Hook., Fl. nov.-zel. 1: 163 (1853); J.D.Hook., Handb. N. Zeal. fl. 176 (1864); F.Muell., Veg. Chatham-Isl. 42 (1864); Benth., Fl. austral. 4: 170 (1869); T.Kirk, Forest fl. New Zealand 213, t. 108 (1889); Rodway, Tasman. fl. 114 (1903); Cheeseman, Man. New Zealand fl. 411 (1906); Cheeseman, Ill. New Zealand fl. 2: t. 124 (1914); Cheeseman, Man. New Zealand fl. 694 (1925).

Styphelia acerosa sensu Laing & Blackwell, Pl. New Zealand 330, t. 109 (1906).

Selected illustrations: Cheeseman, Ill. New Zealand fl. 2: t. 124 (1914); T.Kirk, Forest fl. New Zealand, t. 108 (1889) as *C. acerosa*; Laing & Blackwell, Pl. New Zealand 332, t. 109 (1906) as *Styphelia acerosa* (photo).

Leaves 4–18 mm long, 1–2.1 mm wide, margin typically flat, glabrous or ciliolate toward apex, veins 5. Corolla tube usually glabrous, 1.5–2.8 mm long (male). $n=10$ (Venkata-Rao 1961), $n=11$? in New Zealand material (Sands 1960).

Distribution and Habitat: *Leptecophylla juniperina* subsp. *juniperina* is widespread in lowland to montane forest and shrubland throughout New Zealand, and in lowland areas of Tasmania in the east, areas of the north-west and west on Jurassic dolerite or tertiary basalt based soils (Figs 2, 3).

Flowering Period: Sept.–May.

Chemical Data: Leaf flavonoid bisulphates A and B are present.

Selected Specimens Examined: AUSTRALIA. TASMANIA. Tasman Peninsula: Mt Koonya, A. Moscal 5258 (HO); Mt Raoul, P.A. Collier 21, July 1984 (HO); between Tornado Flats and Lunchtime Creek, A.M. Buchanan 3274 (HO); Balt Spur, S.J. Jarman 25 (HO, NSW). R.K. Crowden 8301-04; Eaglehawk Neck E of Lufra Hill, N.C. Ford, 28 Sept. 1950 (NSW). Other locations: Blue Top, R.K. Crowden 8310-11; Upper Natone forestry reserve, C.M. Mihaich 13; The Clump, Sandy Cape, A. Moscal 4666 (HO); Koyule, W.M. Curtis, 19 May 1947 (HO); Degraeves Valley, R.C. Gunn, 11 Nov. 1839 (HO); Murchison Highway 7.7 km N of Waratah and Guilford Rds junction, A.M. Gray 280, 281 (HO); 5 km SE of Strathgordon on Gordon River Rd, J.R. Busby 27 (HO). NEW ZEALAND. NORTH ISLAND. Northland - Auckland District: Kerr Point North Cape, P. Hynes, 24 Aug. 1957 (AK); near tearooms, Waitiki Landing, R.C. Cooper, 25 Sept. 1969 (AK); Puketiki Forest N of the Waikape Stream, P.J. Bellingham, 26 June 1984 (AK); Urapukapuka Island, Te Akeake Point, R.E. Beaver, 11 Jan. 1980 (AK); Lake Kakupuarere, Poutoi, W.R.B. Oliver, 11 Oct. 1928 (WELT); 2 km SW of Waiwera, G. Straka 336, (AK); Huia Rickards Bush, K. Wood, 6 Aug. 1948 (AK); Mangawhai Hill, R.C. Cooper, 10 June 1966 (AK); Whatipu Road Summit, R. Cooper, 7 Apr. 1965 (AK); Mt William, Pokeno, R.O. Gardner 26 (CHR). Coromandel: Thames, D. Petrie, Sept. 1896 (WELT); Kopu - Hikua Road nr Stadia Creek, R.C. Cooper, 17 Apr. 1967 (AK); Milled bush 2 miles N of Tairua, R.C. Cooper, 18 Apr. 1967 (AK); Burma Road, Whangapoua, R.C. Cooper, 16 Sept. 1965 (AK). Volcanic Plateau District: Whanarua Bay, Bay of Plenty, A.P. Druce, Dec. 1967 (CHR); Lake Taupo nr Whakamoenga Cave, A. Leahy, 11 May 1975 (AK); Wairakei, D. Petrie, Dec. 1895 (WELT); Mt Ruapehu, W.R.B. Oliver, Dec. 1927 (WELT); Tukino track off Desert Road, P. Hynes, 23 Jan. 1968 (AK); Onitapu Desert, V.D. Zotov, 5 Apr. 1931 (CHR); Rainbow Mt, L.B. Moore, 20 Mar. 1930 (CHR); Near Wakapapaiti Stream, D. Petrie, Oct. 1922 (WELT); Waiotapu, W.R.B. Oliver, 13 Sept. 1920 (WELT); Pureora, J.K. Bartlett, 26 Nov. 1977 (CHR). Hawke Bay: Maungaharuru Range, A.P. Druce, Oct. 1974 (CHR); Bell Bird Bush,

A.P. Druce, Dec. 1972 (CHR); Panekiri, Waikaremoana, W.R.B. Oliver, 12 Dec. 1946 (WELT). Wellington Region: Wainuiomata Valley, A.J. Healy, 20 June 1937 (CHR); Tauherenikau Valley, R.L. Oliver, Aug. 1941 (WELT); Days Bay, R. Mason, 4 Oct. 1948 (CHR); Auro Road, Upper Hutt, B.L. Enting, 18 Jan. 1970 (WELT); Summit Rimutaka Range, W.R.B. Oliver, 8 Apr. 1951 (WELT). SOUTH ISLAND. Marlborough: Ship Cove Queen Charlotte Sound, A.P. Druce, 6 Dec. 1953; Red Hills, Wairau Valley, Marlborough, L.B. Moore, 19 Apr. 1965 (CHR); Minginningi, Picton, J.H. McMahon (WELT); Kenepura, J.H. McMahon (WELT); Resolution Bay, L.B. Moore & J. Clarke, 15 Oct. 1965 (CHR). Nelson: E of Parapara Peak, NW Nelson, A.P. Druce, Nov. 1975 (CHR); Mt Burnett, Wakamarama Range, A.P. Druce, Jan. 1982 (CHR); Matiri River, A.P. Druce, May 1977 (CHR); SE slopes of Mt Frederie, P.G. Morgan, 10 Feb. 1912 (WELT); Lake Rotoiti, J.H. McMahon, Nov. 1934 (WELT); Black Hill, M.J.A. Simpson 30 Oct. 1961 (CHR); Track to Falls River from Torrent Bay, A. Lush, Jan. 1951 (WELT); Lead Hills, W.R.B. Oliver, 24 Dec. 1946 (WELT). Canterbury - Westland - Otago: Culverden Plain, L. Cockayne, 2 Nov. 1905 (WELT); Jacks Pass, P. Hynes, 28 Jan. 1965 (AK); Banks Peninsula Castle Rock, P. Douglas, 29 Sept. 1983 (CHR); NW of Kowai Bush, B.H. Macmillan, 30 Mar. 1970 (CHR); Otago Peninsula, Pudding Island, P.N. Johnson, 14 Feb. 1982 (CHR). Southland - Fiordland: Colac Bay, L. Cockayne, 16 Nov. 1905 (WELT); Bluff Hills, Southland, L. Cockayne, Oct. 1902 (WELT); Charles Sound Fiords, W.F. Harris, 28 Feb. 1949 (CHR); Poison Bay, P. Wardler & A.F. Mark, 10 Feb. 1974 (CHR); Head of Milford Sound, W.R.B. Oliver, 19 Dec. 1944 (WELT). Stewart Island: Mt Rakaehua, (WELT); Port Pegasus, C. Black, 22 Jan. 1955 (WELT); North Arm, N.M. Adams, 26 Feb. 1972 (WELT); Pryces Peak, L. Cockayne, 29 Sept. 1908 (WELT).

Notes: The combination *C. acerosa* was correctly made by Roemer & Schultes (1819) although it has often been ascribed to Robert Brown (1810), including by Roemer & Schultes. The name is based on the Banks & Solander manuscript name *Stiphelia acerosa* from collections made by them in New Zealand during Cook's first voyage to the area. Roemer & Schultes incorrectly give Tasmania as the locality hut Cook's first voyage did not land in Tasmania. Two and probably three sheets with Banks and Solander specimens are at BM. One bears the citation 'In sylvis prope Opuragi, Totaranui', the second sheet has a typewritten label with the date '5th-15th Nov. 1769', at which time Cook was anchored in Mereury (now Cook) Bay, and a reference to 'Solander, Prim. Fl. N. Zeal. p. 437, Parkinson Ic. 120.' The specimens are vegetative or with a few fruit. There is little doubt that Gaertner based the name *Ardisia acerosa* on Solander's manuscript name *Stiphelia acerosa*, nor that subsequent authors did other than follow this concept. The Banks and Solander specimens of *Stiphelia acerosa* and the Forster specimens of *Epacris juniperina* at BM represent the same taxon.

Leptecophylla juniperina subsp. *parvifolia* (R.Br.) C.M.Weiller *comb. et stat. nov.* *Cyathodes parvifolia* R.Br., Prodr. 540 (1810). *Type citation:* [D] v.v. *Type:* '*Stiphelia erythrocarpa*, In lateribus ..., Montis Tabularis ad fluo: Derwent, Feb: - May 1804', R.Brown (*Bennett No. 2416*) (holotype BM, photo HO; isotype K). On the reverse of the handwritten label of the type is '4 *Cyathodes parvifolia* prodr. 540'. The typed label has the dates Feb. 18th, 19th, and 27th 1804. A second sheet with a single specimen bears the same typed label. Both bear the manuscript name *Stiphelia erythrocarpa*. *Lissanthe parvifolia* (R.Br.) Spreng., Syst. veg. 1: 660 (1824), *Stiphelia parvifolia* (R.Br.) F.Muell., Pap. Proc. Roy. Soc. Tas. 86 (1874), *Stiphelia oxycedrus* Labill. var. *parvifolia* (R.Br.) Sleumer, Blumea 12: 156 (1963).

Cyathodes parvifolia sensu Roem. & Schult., Syst. veg. 4: 472 (1819); G.Don, Gen. hist. 3: 776 (1834); DC., Prodr. 7: 741 (1839); J.D.Hook., Fl. Tasman. 246 (1857); Rodway, Tasman. fl. 115 (1903); W.M.Curtis, Stud. Fl. Tasman. 2: 428 (1963).

Leptecophylla juniperina subsp. *parvifolia* is the small leafed highland form, leaves 4.2–5.8 mm long, 1.4–1.7 mm wide, margin recurved, ciliolate toward apex, 3(–5) veined. Corolla tube glabrous, 2.1–3.5 mm long (male). $2n=20$ (Smith-White 1955, as *Cyathodes parvifolia*).

Distribution and Habitat: Common at altitudes above 600 m in the central and eastern parts of Tasmania, on rocky dolerite slopes in open eucalypt forests and also on the lower Carboniferous-Devonian rock types in the north-east (Fig. 2).

Flowering Period: (Oct.–)Nov.–Dec.(–Jan.)

Chemical Data: Leaf flavonoid bisulphate A is present.

Selected Specimens Examined: AUSTRALIA. TASMANIA. Mt Wellington: Wellington Falls *L. Rodway* 146 (HO); *J.M. Powell* 504A (HO, NSW); Collinsvale Track. *W.M. Curtis*, 23 Dec. 1951 (HO); Collins Cap to Trestle Mountain Track, *A. Brown* 19 (HO); Mt Arthur towards Collinsvale, *F.H. Long* 1054 (HO). Mt Field: slopes above Lake Fenton, *N.T. Burbidge* 3278 (HO); near Lake Dobson huts, *J.M.B. Smith* 242 (HO); slopes of Mt Field East. *J. Vickery*, 17 Jan. 1962 (NSW). Central Plateau: 7 miles N of Breona, *J.H. Hensley* 6300 (HO, NSW); Mienna, *A.T. Dobson* 77230 (HO); Pine Lake, *F. Duncan* 18 (HO); Alma Pass W of Interlaken, *J.M. Powell* 1628 (HO, NSW); Bradys Lookout summit, *A. Moscal* 630 (HO); Gorge-Jackeys Marsh Road, Meander, *J. Somerville*, 13 May 1962 (HO); Liaweenee, *R.K. Crowden* 8310-09; Ironstone Bluff, *R.K. Crowden* 8310-08. Ben Lomond region: near road at top of Jacobs Ladder, *M.G. Noble* 28104 (HO); Mt Victoria, *M.G. Noble* 29209 (HO); NE slope of Mt Saddleback, *P. Collier*, 1 July 1984 (HO); S of Maurice Road, 500 m E of Wayback Hill, 20 km SSE of Scottsdale, *J.R. Bnsby* 101 (HO). Other locations: track up Mt Rufus c. 5 km W from Cynthia Bay camping area, Lake St Clair, *J.M. Powell* 1618 (HO); Poatina Highway, *M. Thompson* 24 (HO); Victoria Valley Road, *W.M. Curtis*, 24 Feb. 1983 (HO); Arthurs Lakes *R.C. Gumm*, 17 Nov. 1845 (HO); East Bagdad Road E of Long Tom, *A.M. Gray* 605 (HO); High Peak, *H.D. Gordon*, 1 Nov. 1937 (HO); Horseshoe Marsh St Pauls River, *A. Moscal* 286 (HO).

Leptecophylla juniperina subsp. *oxycedrus* (Labill.) C.M. Weiller *comb. & stat. nov.* *Styphelia oxycedrus* Labill., Nov. Holl. pl. 1: 49, t. 69 (1805). *Type citation:* ‘in capite van Diemen, Labill.’ (holotype FI-WEBB, seen in photo). *Cyathodes oxycedrus* (Labill.) R.Br., Prodr. 540 (1810). *Cyathodes acerosa* (Gaertn.) Roem. & Schult. var. *oxycedrus* (Labill.) Cheeseman, Man. New Zealand fl. 411 (1906). *Cyathodes juniperina* (J.R. Forst. & G. Forst.) Druce var. *oxycedrus* (Labill.) Allan, Fl. New Zealand 1: 516 (1961). *Styphelia oxycedrus* Labill. var. *oxycedrus* Sleum., Blumea 12: 155 (1963) in key. *Lissanthe oxycedrus* (Labill.) Spreng., Syst. veg. 1: 660 (1824).

Styphelia oxycedrus sensu Poir., Encycl. 7: 487 (1806); F. Muell., Fragm. 6: 43 (1867). *Cyathodes oxycedrus sensu* Roem. & Schult., Syst. veg. 4: 472 (1819); G. Don, Gen. hist. 3: 776 (1834); DC., Prodr. 7: 741 (1839); J.D. Hook., Fl. Tasman. 246 (1857). *Cyathodes acerosa* var. *oxycedrus sensu* Cheeseman, Man. New Zealand fl. 694 (1925).

Illustrations: Labill., Nov. Holl. pl. 1: t. 69 (1805).

Leptecophylla juniperina subsp. *oxycedrus* is a low, rigid shrub characterised by broader leaves, 7–12.4 mm long, 1.5–2.5 mm wide, with 5–7 veins, margin flat and entirely glabrous. Corolla tube 2.6–4.4 mm long (male) or 2.3–2.8 mm long (female), regularly with short, sparse, bristle-like hairs on the inner surface.

Distribution and Habitat: This form is restricted to the exposed, rocky, coastal regions of southern and western Tasmania, the Bass Strait Islands and southern Victoria, occurring on tertiary basalts and Pre-Cambrian metamorphic rock types (Fig. 2).

Flowering Period: (Aug.–)Sept.–Oct.(–Nov.)

Chemical Data: Leaf flavonoid bisulphates A and B are present.

Notes: Robert Brown (1810) noted the close similarity of *Styphelia* [*Cyathodes*] *oxycedrus* and *C. acerosa*.

Selected Specimens Examined: AUSTRALIA. VICTORIA: Cape Woolamai Phillip Island, 4 miles SE of automatic light, *A. Opie & S. Van Berkel* P.I. 27 (HO); Wilsons Promontory, *R.K. Crowden* 8508-204; Tongue Point, *J.H. Willis* 8 Nov. 1970 (MEL); Chinaman Long Beach, *P.C. Heyligers* 81030 (MEL). TASMANIA: West Point, *A. Moscal* 7735 (HO); Marrawah, *W.M. Curtis*, May 1948 (HO); Green Point, *W.D. Jackson*, Jan. 1958 (HO); Coxs Bight, *D.I. Morris* 8285 (HO); Sanctuary Bay, *A.M. Buchanan* 2613 (HO); Bond Bay, *M. Davis* 1260 (HO, MEL); Bluff Hill

Point, A. Moscal 7866 (HO); Nettley Bay, A. Moscal 7764 (HO); Nye Bay, R. Buttermore 005 (HO); Maatsuyker Island, A. Moscal, Nov. 1976 (HO), Aug. 1976 (HO); Macquarie Harbour, L. Rodway, Aug. 1891 (HO); Catamaran, H.F. Comber 2263 (HO); Woolnorth, R.C. Gmu, 22 Sept. 1838 (HO, NSW); Recherche Bay, J.H. Maiden, Mar. 1908 (NSW). Bass Strait Islands: Grassy, King Island, W.M. Curtis, 29 Oct. 1976 (HO); Furneaux Group, East Sister Island, J.S. Whinray 276 (MEL); Deal Island, N.P. Brothers 407 (HO); Mt Chapell Is, J.S. Whinray 1138, 1162 (MEL); Dover Is. Myrinidon Bay, J.H. Mullet, Dec. 1966 (MEL); Mt Strzelecki Track, P. Collier 790 (HO); Rabbit Is, J. Bovisto (MEL); Doughboy Is., J.W. Andas, Dec. 1912; Kents Is., R. Brown (MEL).

2. *Leptecophylla pogonocalyx* C.M. Weiller *sp. nov.*

A *L. juniperina* (J.M. Forst. & G. Forst.) C.M. Weiller bracteolis et sepalis puberulis et corolla glabra tubo calycem aequanti vel brevior differt.

Typus: From the eastern slopes above Lake Dove, Cradle Mountain–Lake St. Clair National Park, Tasmania, 21 Nov. 1985, C.M. Mihaich 5 (holotype HO).

Dioecious (?), compact or tall *shrubs* 50–200 cm high. *Stems* grey or grey-brown; *branchlets* yellow-brown or brown, rounded, puberulent or pubescent. *Leaves* evenly spaced, usually spreading or somewhat reflexed, narrowly ovate, 5.2–9.9 mm long, 1.2–1.9 mm wide, apex acute, tip pungent 0.4–1.2 mm long; margin flat or slightly recurved, glabrous or ciliolate only towards the apex; upper surface glabrous or puberulent at base; lower surface with intervenal papillae and 5 veins; *petiole* erect, 0.8–1.5 mm long, appressed to stem, glabrous or puberulent on the upper surface. *Flowers* (Fig. 4) solitary, terminal and axillary on usually erect pedicels 3–4 mm long (male), 1.7–2.4 mm long (female); *bracts* ovate, 0.5–0.8 mm long, 0.6–1 mm wide, obtuse, glabrous or puberulent at apex, margin glabrous or ciliolate at the apex; *bracteoles* and *sepals* ovate, broadly acute or obtuse, the apex occasionally with a short



Fig. 4. Air dried 'male' flower of *L. pogonocalyx* showing hairy calyx, and corolla tube about equalling the calyx, J.M. Powell 1539.

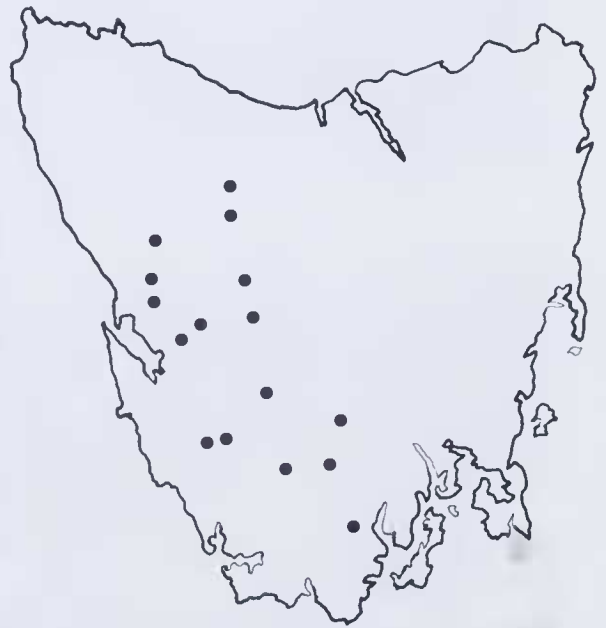


Fig. 5. Distribution of *Leptecophylla pogonocalyx*.

micro, puberulent; bracteoles 10–22 per flower, imbricate, 1.6–2.7 mm long, 1.4–2 mm wide; sepals 2.1–3.1 mm long, 1.4–2.1 mm wide. *Corolla tube* campanulate, equal to or shorter than the calyx, 1.9–2.5 mm long (male), 1.6–2.4 mm long (female), glabrous; *lobes* shorter than tube, glabrous, 1.3–1.8 mm long, apex acute. *Anthers* of male flowers 0.8–1.6 mm long, enclosed or half-exserted; *filaments* 0.2–0.3 mm long. *Ovary* spherical, 0.6–1 mm high, 1–1.3 mm wide, glabrous, 4–6 celled; *style* straight, glabrous, attenuate from the ovary, 1.1–1.4 mm long (male), 0.9–1.3 mm long (female); *stigma* 0.1 mm high; *nectary* separating into distinct scales with pressure, or in distinct scales, 0.3–0.5 mm high, margin entire, toothed or rounded, glabrous or occasionally with hairs. *Drupe* pink, spherical, 3–5 mm high, 5–8 mm wide, 1–5 locules with ovules developing into seeds.

Comments: *Leptecophylla pogonocalyx* is distinguished from *L. juniperina* by the short corolla tube, which is equal to or shorter than the calyx in both floral forms and the puberulent calyx and bracteoles.

Distribution and Habitat: Confined to the western region of Tasmania, usually at altitudes above 600 m (Fig. 5).

Etymology: The epithet *pogonocalyx* refers to the densely puberulent calyx.

Flowering Period: Nov.–Dec.

Leaf Anatomy: The leaf is 360–370 µm thick with the adaxial cuticle 12.5–15 µm and the abaxial cuticle 2.5 µm thick. Rounded papillae occur in the stomatal regions. Adaxial epidermal cells heavily lignified, 32.5–37.5 µm long, 17.5–20 µm wide; abaxial cells narrowly lignified, small, 12.5–17.5 µm long, 12.5 µm wide. Three rows of elongate palisade mesophyll cells 95 µm long, 20 µm wide are associated with a very compact spongy mesophyll of rounded cells. Fibres form an arc beneath the vascular bundle and occasionally a cap on the adaxial side of the bundle. Endodermal cells remain unthickened.

Chemical Data: The triterpenes β-amyrin and 'N' are the major components in the leaf wax. Leaf flavonoid bisulphates A and B are present.

Selected Specimens Examined: AUSTRALIA. TASMANIA. Cradle Mountain - Lake St Clair National Park: near Lake Henson, 3 km NE of Cradle Mountain, 4 km SE of Waldheim, *J.R. Busby* 73 (HO); Labyrinth Track above Cephissus Creek (Pine Valley) about 2/3 of the way to the ridge crest, *J.R. Busby* 135 (HO); track to Marions Lookout, *J.M. Powell* 1539 (CANB, HO, NSW). Mt Field National Park: Platypus Tarn, *S.J. Forbes* 1282 (HO); by 2nd bend on road below Lake Fenton, *R. Melville* 2379, 2380 (HO, NSW). Hartz Mountain National Park: Track to Lake Osborne, 600 m ESE of the lake, *J.R. Busby* 1/4 (HO); Arve Road, *J. Somerville* (HO); junction of Hartz Hut track and Hartz Rd, *R. Filson* 10485 (MEL). Western Tasmania: S of Queenstown, *M.L. Westbrook*, 22 May 1938 (HO); Lake Margaret Track, *J. Somerville*, Mar. 1957 (HO); Rosebery, *W.M. Curtis*, 7 Dec. 1954 (HO); Lake Arthur, Western Arthur Range, *I. Olsen*, 7 Jan. 1967 (HO, NSW); Frenchmans Cap Range, *H.D. Gordon*, 14–15 Dec. 1944 (HO); Mt Sprent, *S.J. Jarman*, 10 Dec. 1978 (HO); NE ridge of Mt Anne, *A.M. Buchanan* 3719 (HO); King William Range, *E. Rodway* 325 (HO); Mt. Brown, *L. Rodway*, Jan. 1910 (HO); Gilbert Leitch Huon Pine Reserve, *A. Moscal* 10916 (HO); Denison Range, *C. Elliott*, 2 Jan. 1947 (HO); Bonds Range, *A. Moscal* 1044 (HO); Jubilee Range, *A. Moscal* 9346 (HO); Swift Creek, Cape Sorell, *A.M. Buchanan* 2277 (HO); Mt La Perouse, *F.A. Rodway*, 29 Nov. 1898 (NSW).

3. *Leptecophylla divaricata* (J.D.Hook.) C.M.Weiller, *comb. nov.* *Lissanthe divaricata* J.D.Hook., *Lond. J. Bot.* 6: 269 (1847). *Type citation:* Hobart Town, Mt. Wellington, Swan Port; *Backhouse*, *Gunn*;— v.v.n. *Type:* 618/1842 *Lissanthe divaricata*, Mt. Wellington, 8/5/39, *Gunn* (lectotype, here designated, K). Six Gunn specimens and three labels with the locations Mt. Wellington, Swanport and Cornish Hill are present on a single sheet at K. The element selected as lectotype is on the right hand side of the sheet, in flower, from Mt. Wellington. Backhouse specimens, cited by Hooker, were not located at K or BM. *Cyathodes divaricata* (J.D.Hook.) J.D.Hook., *Fl. Tasman.* 1: 246, t. 74B (1857). *Styphelia remota* Sleum., *Blumea* 12: 156 (1963), *nom. superfl.*

Cyathodes divaricata sensu Benth., *Fl. austral.* 4: 170 (1868); Rodway, *Tasman. fl.* 114 (1903); *W.M. Curtis*, *Stud. Fl. Tasman.* 2: 428 (1963).

Illustrations: J.D.Hook., *Fl. Tasman.* 1: t. 74B (1857)

Dioecious, slender *shrubs* to 2 m high. *Stems* erect, grey-brown or grey; branchlets red-brown, rounded, scabrous. *Leaves* evenly spaced, absent on older stems, spreading or occasionally reflexed, narrowly ovate, 9.2–12.7 mm long, 1.2–1.5 mm wide, convex, apex acute, tip pungent, 0.6–1.4 mm long, margin recurved, glabrous, scaberulous or ciliolate, upper surface glabrous or occasionally puberulent near base; lower surface with intervenal papillae and 5 conspicuous parallel veins; *petiole* erect, 1–1.5 mm long, appressed to stem, puberulent. *Flowers* solitary, terminal and axillary, pendulous from bud, pedicel 3.1–5.8 mm long (male), 2–7.3 mm long (female); *bracts* ovate, 0.7 mm long, 0.4–0.6 mm wide, apices acute, glabrous or occasionally puberulent outside, ciliolate on the margins; *bracteoles* and *sepals* ovate with the midrib abaxially inconspicuous, glabrous; bracteoles 8–29 per flower, loosely imbricate below calyx, 1.1–1.8 mm long, 1.1–1.5 mm wide; sepals 1.6–2.9 mm long, 1.4–1.7 mm wide. *Corolla tube* exceeding calyx, thin, U-shaped, 5.5–6.7 mm long (male), 3.8–5 mm long (female), sparsely pubescent internally; *lobes* shorter than tube 1.7–2.2 mm long (male), 1.9–2.5 mm long (female), apices acute, externally glabrous, internally with long sparse hairs distributed overall inside. *Anthers* of male flowers 1.2–1.6 mm long, enclosed within corolla or half-exserted; *filaments* 0.2 mm long. *Ovary* spherical, 0.8–1.3 mm high, 0.9–1.5 mm wide, glabrous, 5(–6) celled; *style* usually bent, glabrous or pubescent near the middle, seated in an apical depression, 3.6–4.5 mm long (male), 3.7–5 mm long (female); *stigma* lobed, 0.1 mm high; *nectary* continuous, 0.4–0.6 mm high, with truncate or toothed shortly hairy margin. *Drupe* pale to dark pink, spherical, 6–10 mm high, 7–12 mm wide, apically depressed, glabrous, 1–5 locules with ovules developing into seeds, others aborting, $n=12$ (Venkata-Rao 1961, as *Cyathodes*), $2n=24$ (Smith-White 1955, as *Cyathodes*).

Distribution and Habita: Endemic to Tasmania, growing on dry rocky hillsides in open eucalypt forests of the eastern part of the state (Fig. 6).

Flowering Period: Mar.–Sept.

Leaf Anatomy: The leaf is 260–280 μm thick with the adaxial cuticle 12.5 μm and the abaxial cuticle 2.5–5 μm thick. Papillae 20–22.5 μm long with a rounded apex and slightly thickened walls occur in the stomatal regions. Adaxial epidermal cells are heavily lignified, 10–32.5 μm long, 17.5 μm wide; abaxial epidermal cells are narrowly lignified,



Fig. 6. Distribution of *Leptecophylla divaricata*.



Fig. 7. Distribution of *Leptecophylla pendulosa*.

7.5–10 µm long, 10 µm wide. Two rows of palisade mesophyll cells, 27.5–40 µm long, 15–17.5 µm wide, occur adaxially above open short-rectangular spongy mesophyll. Fibres occur only beneath the vascular bundles and the abaxial endodermal cells are unthickened.

Chemical Data: Ribbon wax covers the abaxial leaf surface. Wax composition is dominated by triterpenoids α -amyrenone (21%), β -amyrenone (12%) and α -amyrin (8%), C_{28} aldehyde (4%) and alcohol (9%). Triterpenes F and G are minor. Leaf flavonoid bisulphate A is present.

Selected Specimens Examined: AUSTRALIA. TASMANIA: Barbers Marsh, East Bagdad Rd 4 km due S of Quoin Mt, A.M. Gray 399 (HO); Organ Hill near Bicheno, A. Moscal 172 (HO); Black Charlies Opening, A.M. Buchanan 3590 (HO); west ridge of Brown Mt, P. Collier, 15 June 1984 (HO); Sam Smiths Hill 2 km NE of Kaoota, A. Moscal 790 (HO); 'M' Rd T.P.F.H. private rd 5 km from Lake Leake Rd, A.M. Gray, 1 June 1978 (HO); Orford above Prosser River nr rubbish tip, M.G. Corrick 2104 (MEL); Cape Bernier, W.M. Curtis, 13 Jan. 1945 (HO); Lenah Valley Track, F.H. Long 366 (HO); Coles Bay, W.M. Curtis, Nov. 1948 (HO); South Island, Maria Is, M.J. Brown 219 (HO); Chimney Pot Hill, R.K. Crowden 8307-01; Hospital Creek, C.M. Mihaich 1; Grasstree Hill, D.A. & A.V. Ratkowsky 417 (NSW); Spring River, W.M. Curtis, 9 Sept. 1951 (HO); Piermont, mouth of Stony River, S of Swansea, S. Harris, 25 Jan. 1979 (HO); Mt Nelson, Rodway 153 (HO); Mt Direction, F.A. Rodway, June 1922 (NSW).

4. *Leptecophylla pendulosa* (S.J. Jarman) C.M. Weiller, *comb. nov.* *Cyathodes pendulosa* S.J. Jarman, Pap. Proc. Roy. Soc. Tas. 112: 2 (1978). *Type citation:* Foothills of Ben Lomond, Tasmania, 16 June 1976, R.K. Crowden & S.J. Jarman (holotype HO).

Dioecious, diffuse or compact *shrubs* to 1.5 m high. *Stems* erect, brown or grey-brown; *branchlets* brown, rounded, pubescent. *Leaves* evenly spaced, spreading, narrow ovate, 3.8–7.9 mm long, 0.9–1.8 mm wide, flat, apex acute, tip pungent 0.6–0.9 mm long, margin flat or slightly recurved, ciliate, upper surface glabrous, lower surface with intervenal papillae and 3–5 conspicuous veins; *petiole* erect, 0.4–1 mm long, appressed to stem, glabrous or occasionally puberulent on the upper surface. *Flowers* solitary, usually terminal only but also axillary, erect or pendulous from bud, pedicel 2.3–4 mm long; *bracts* weakly keeled, ovate, 0.4–0.7 mm long, 0.3–0.6 mm wide, apices obtuse, puberulent outside, ciliolate on the margins; *bracteoles* and *sepals* ovate with the midrib abaxially inconspicuous, glabrous or sparsely pubescent inside; bracteoles 13–37 per flower, imbricate, 1.7–2.9 mm long, 1.3–2 mm wide; sepals ovate to elliptic, 2.6–3.6 mm long, 1.2–2.2 mm wide. *Corolla tube* exceeding calyx, thin, U-shaped, or campanulate, 3.2–4.3 mm long (male), 2.8–3.5 mm long (female), glabrous; *lobes* shorter than tube 1.7–2.3 mm long, apices acute, externally glabrous or rarely with a few hairs at the base of the lobes, internally glabrous. *Anthers* of male flowers 1–1.4 mm long, enclosed within corolla; *filaments* 0.1–0.2 mm long. *Ovary* spherical, 0.5–1 mm high, 0.6–1 mm wide (male), 1–1.4 mm high, 1–1.4 mm wide (female), glabrous, (4–)5(–6) celled; *style* bent, glabrous, seated in an apical depression, 3.1–4.4 mm long (male), 2.1–2.9 mm long (female); *stigma* lobed, 0.1 mm high; *nectary* continuous, 0.4–0.7 mm high, glabrous, with toothed upper margin. *Drupe* pink, spherical, 6.3–9 mm high, 6–10 mm wide, apically depressed, glabrous, 0–5 locules with ovules developing into seeds.

Distribution and Habitat: Endemic to Tasmania, occurring in rocky, open eucalypt woodland in the north-east (Fig. 7).

Flowering Period: May–July.

Leaf Anatomy: Leaf 230–240 µm thick with adaxial and abaxial cuticles 5 µm. Papillae with a rounded apex, 17.5 µm long cover the stomatal regions. Adaxial epidermal cells are heavily lignified, 25–32.5 µm long, 16.3–18.8 µm wide; abaxial epidermal cells are narrowly lignified, 7.5–12.5 µm long, 11.3–15 µm wide, smaller beneath the veins than in the stomatal areas. A single row of palisade cells 45–62.5 µm long, 15 µm wide

are associated with an open spongy mesophyll consisting of short-rectangular cells. Fibres are abaxial to the vascular bundles and the endodermal cells unthickened.

Chemical Data: Ribbon wax covers the abaxial leaf surface. Wax composition is dominated by triterpenoids (69%) α -amyrin, β -amyrin and β -amyrenone with F and G minor components. Leaf flavonoid bisulphate A is present.

Specimens Examined: AUSTRALIA, TASMANIA: Nicholls Cap, P. Collier, 5 May 1984 (HO); Nicholls Cap summit, A. Moscal 181 (HO); Nicholls Cap W of Seymour Beach, S. Harris, 25 Jan. 1979 (HO); Mt Nicholas, R.K. Crowden 78-16; Mt Allen, A. Moscal 174 (HO); Bedgood Hill, near Bicheno, A. Moscal 240 (HO); top of St Patricks Head, St Marys, ex Herbarium Miss F. Brumby, July 1876 (MEL); St Patricks Head, A.M. Buchanan 918 (HO); St Patricks Head State Reserve, A. Moscal 2442 (HO); NE slope of Mt Saddleback, P. Collier, 1 July 1984 (HO); Scamander, L. Rodway, May 1892 (HO); Big Peppermint Hill, A. Moscal 375 (HO); Tower Hill, A.M. Gray, 31 May 1978 (HO); 8 km along Valley Rd, Fingal Tier, P. Collier 504 (HO); St Pauls River E of Cutoff Hill, P. Collier 521 (HO); Northsister, A. Moscal 770 (HO); Lake Leake, R.K. Crowden 8307-02; 'M' Road, C.M. Mihaich 31; Meetus Falls, C.M. Mihaich 32.

5. *Leptecophylla robusta* (J.D. Hook.) C.M. Weiller, *comb. nov.* *Cyathodes acerosa* (Gaertn.) R. Br. ex Roem. & Schult. var. *latifolia* J.D. Hook., Fl. nov.-zel. 1: 163 (1853). *Type citation:* Chatham Is., Dieffenbach (holotype K). *Cyathodes robusta* J.D. Hook., Handb. N. Zeal. fl. 177 (1864). *Styphelia robusta* (J.D. Hook.) Sleum., Blumea 12: 159 (1963).

Cyathodes acerosa var. *latifolia sensu* Mueller, Veg. Chath.-Isl. 43 (1864). *Cyathodes robusta sensu* Cheeseman, Man. New Zealand fl. 411 (1906); Cheeseman, Man. New Zealand fl. 695 (1925); Allan, Fl. New Zealand 1: 516–517 (1961).

Dioecious, shrubs or trees to 5 m high. Stems grey-brown or grey. Branchlets yellow-brown or brown, rounded, puberulent. Leaves erect or spreading, ovate or oblong, 9.9–16.2 mm long 2.2–3.4 mm wide, flat, apex obtuse, with a callus tip; margin recurved slightly, glabrous or ciliolate only at the apex, upper surface glabrous, lower surface with intervenal papillae and 6–8 conspicuous veins; petiole 1.3–2 mm long, puberulent on the upper surface. Flowers solitary, terminal and axillary, erect, pedicel 3.1–4.1 mm long (male), 2.4–3.2 mm long (female); bracts triangular, 0.7–9 mm long, 0.9–1.4 mm wide, apices obtuse, glabrous outside, ciliolate on the margins toward the apex; bracteoles and sepals glabrous, conspicuously striate when dry; bracteoles 9–21 per flower, imbricate, 1.7–2.2 mm long, 1.5–2.1 mm wide; sepals ovate, 2.1–2.6 mm long, 1.6–2.1 mm wide. Corolla tube usually equal to calyx, thin, U-shaped, 1.7–2 mm long; lobes more or less equal to tube 1.7–2.1 mm long, apices broadly acute, glabrous or internally occasionally sparsely hairy. Anthers of male flowers 1.1–1.4 mm long, usually enclosed within corolla; filaments 0.4–0.7 mm long. Ovary spherical, 0.7–1.1 mm high, 0.9–1.1 mm wide, glabrous, 4 or 5 celled; style straight, glabrous, tapering to the ovary, 1.1–1.4 mm long (male), 0.9–1.2 mm long (female); stigma 0.1 mm high; nectary continuous, 0.4–0.7 mm high, usually with a toothed upper margin. Drupe red, spherical, 5–6 mm high, 6–9 mm wide, 2–5 locules with ovules developing into seeds.

Distribution and Habitat: Endemic to the Chatham Islands, New Zealand, in rocky areas.

Flowering Period: Oct.–Nov.

Leaf Anatomy: The leaf is 370–390 μ m thick with the adaxial cuticle c. 12.5 μ m and the abaxial cuticle 5 μ m. Thick walled papillae with a rounded apex 20 μ m long cover the stomatal regions. Adaxial epidermal cells are lignified, 25–27.5 μ m long, 15–27.5 μ m wide; abaxial epidermal cells are narrowly lignified, 5–10 μ m long, 10 μ m wide, smaller beneath the veins. Two rows of palisade cells 62.5–92.5 μ m long, 16.3–20 μ m wide, are associated with a compact spongy mesophyll composed of small rounded cells. Several fibre cells are occasionally present above the vascular bundles in addition to the abaxial arc. Endodermal cells are unthickened.

Chemical Data: Ribbon wax covers the abaxial leaf surface. Wax composition is dominated by triterpenoids α -amyrenone (31%), β -amyrenone (15%), α -amyrin (5%), F and F1 with the C₂₈ homologue of the aldehyde (8%) and alcohol (11%) constituting most of the remainder of the wax.

Specimens Examined: NEW ZEALAND. CHATHAM ISLANDS: F.A.D. Cox, Oct. 1900 (AK, CHR); near Waikato Point, M.A. & I.M. Ritchie, 17 Sept. 1968 (CHR); Tuku Creek area, SW Chathams, K. Olsen, 7 Jan. 1978 (AK); Taiko Hill, K.P. Olsen, 12 Jan. 1978 (AK); Waitangi, West Moorland, 7 Feb. 1985, B. Molloy; Chudleigh Reserve at Waimahana Creek, D.R. Given 12773 & P.A. Williams (CHR); Te Awatea, E. Madden 108 (CHR); Nairn River, G. Hamel, 27 Jan. 1976 (CHR); pen ground 1 km SE of Lake Rotokawau near pond, D.R. Given 12759 & P.A. Williams (CHR); Tobacco County S of Chatham Is, Cox & Cockayne, Feb. 1901 (AK); Kahiti Stream near Owenga, B.G. Hamilton, 1948 (WELT); Southern Table-land above Te Awainanga River, A.T. Moar 568, 1569, 1570 (CHR); A. Sinclair, 1850-1860 (NSW).

6. *Leptecophylla abietina* (Labill.) C.M. Weiller, *comb. nov.* *Styphelia abietina* Labill., Nov. Holl. pl. 1: 48, t. 68 (1805). *Type citation:* Capite van Diemen, Labill. (lectotype here designated, FI-WEBB sheet number 118262, seen in photo). There are three sheets at FI-WEBB. The sheet selected as lectotype comprises a single fruiting specimen and carries extensive descriptive notes in Labillardière's hand. *Cyathodes abietina* (Labill.) R. Br., Prodr. 540 (1810).

Styphelia abietina sensu Poir., Encycl. 7: 486 (1806); Spreng., Syst. veg. 1: 659 (1824); F. Muell., Fragm. 6: 43 (1867); Sleum., Blumea 12: 155 (1963) in key.

Illustrations: Labill., Nov. Holl. pl. 1: t. 68 (1805). *Cyathodes abietina sensu* Roem. & Schult., Syst. veg. 4: 472 (1819); G. Don, Gen. hist. 3: 776 (1834); DC., Prodr. 7: 741 (1839); J.D. Hook. Fl. Tasman. 247 (1857); Rodway, Tasman. fl. 114 (1903); W.M. Curtis, Stud. fl. Tasman. 2: 427 (1963).

Dioecious, compact, erect *shrubs* 1–2 m high. *Stems* grey or grey-brown; *branchlets* brown or rarely yellow-brown, densely puberulent. *Leaves* evenly spaced, usually absent on main stems, sub-erect, narrowly ovate, flat, 12.3–18 mm long, 1.9–2.7 mm wide, tip short and hard, the mucro 0.3–1.2 mm long; margin flat, glabrous or ciliolate toward the apex, upper surface green, glabrous or with sparse hairs toward the base, lower surface with short trichomes fringing shallow grooves and up to 7 veins; *petiole* erect, 1.8–3.1 mm long, appressed to stem, sparsely puberulent. First leaves of new season's growth obovate, 11–19 mm long, 3.1–5.2 mm wide, margin hyaline to scarious. *Flowers* solitary, terminal and axillary on erect pedicels 3.5–4.2 mm long (male), 2.4–3 mm long (female); *bracts* broadly ovate, 0.8–1 mm long, 0.8–1.1 mm wide, obtuse, margin usually glabrous; *bracteoles* and *sepals* broadly ovate, obtuse, glabrous, conspicuously striate when dry; *bracteoles* 6–26 per flower, imbricate, 2.1–2.6 mm long, 1.9–2.4 mm wide; *sepals* 2.8–3.8 mm long 2–2.6 mm wide. *Corolla tube* thick, fleshy, exceeding calyx, campanulate, 4–4.5 mm long (male), 3–3.2 mm long (female), upper half sparsely pubescent internally; *lobes* 2–3.1 mm long, externally glabrous or with a few short hairs at the base of the lobes, internally densely bearded, short at the apex, long below, apex broadly acute to obtuse, thickened. *Anthers* of male flowers 1.8–2.6 mm long, half exerted; *filaments* 0.4–0.6 mm long. *Ovary* spherical 1.1–1.2 mm high, 1.1–1.5 mm wide, glabrous, 4–7 celled; *style* glabrous, attenuate from the ovary, 1.4–1.8 mm long (female), 1.8–2.3 mm long (male); *stigma* lobed; *nectary* 0.5–0.8 mm high, separating into scales with pressure, margin toothed. *Drupe* pale to dark pink, 5–9 mm high, 7–12 mm wide, slightly flattened sphere, surface dull, mesocarp dry.

Distribution and Habitat: Endemic to Tasmania, restricted to the exposed rocky coasts of the SE, S and W and neighbouring islands between Southport Bluff in the SE to Trial Harbour on the W coast. Also recorded from Walker Is. off the NW coast and South Arm in the SE (Fig. 8).



Fig. 8. Distribution of *Leptecophylla abietina*.

Flowering Period: Oct.–Nov.(–Apr.)

Leaf Anatomy: The average leaf thickness is 500–550 μm with the adaxial cuticle 17.5–22.5 μm thick and the abaxial cuticle 12.5–17.5 μm . Intervenal grooves 120–150 μm deep are lined with heavily cutinised trichomes 60 μm long. Stomata occur at the base and sides of the grooves level with surrounding epidermal cells. Adaxial epidermal cells are large, c. 37.5 μm long, 25 μm wide and heavily lignified; abaxial epidermal cells are much smaller, 15–20 μm long, 10–12.5 μm wide, with less thickening. Two to three rows of elongate palisade mesophyll cells, c. 60 μm long, 20 μm wide, and short rectangular spongy mesophyll cells are present. Fibres form an arc beneath the vascular bundles, and 'endodermal' cells between the fibres and abaxial epidermis are lignified.

Chemical Data: Ribbon wax is confined to the intervenal grooves and the short trichomes lining them. Wax composition is dominated by triterpenoids β -amyrenone, α -amyrenone, F and F1 (total 68 %) with hydrocarbons C_{29} (1 %), C_{31} (2 %) and the aldehyde homologue C_{28} (1 %) of minor significance. Leaf flavonoid bisulphates are absent.

Selected Specimens Examined: AUSTRALIA. TASMANIA: Southport Bluff, *P. Collier* 742 (HO); Southport Island, *C. Stuart* 1677, Sept. 1855 (MEL); South Cape Bay, *H.F. Comber* (HO), *A.M. Buchanan* 3165 (HO); Shoemaker Bay, *A.M. Buchanan* 3520 (HO); Cox Bight, south end of Black Cliff Hills, *A.M. Buchanan* 3385 (HO); W end of Turua Beach, *A.M. Buchanan* 3441 (HO); W end of Prion Beach, *A.M. Buchanan* 3462 (HO); end of Little Lagoon Beach, *P. Collier* 739 (HO); De Witt Islands, *L. Rodway* (HO); Maatsuyker Is, *A. Moscal*, Aug. 1976 (HO), *A. Moscal*, Nov. 1976 (HO); Trumpeter Is, entrance to Port Davey, *G. White*, 28 Dec. 1980 (HO); Hobbs Is, entrance to Port Davey, *G. White*, 28 Dec. 1980 (HO); Flat Witch Is, *G. White*, 23 Dec. 1978–8 Jan. 1979 (HO); Niblin Point, *A.M. Buchanan* 2497 (HO); rocky coast between Meerin Beach and Evans Creek, *A.M. Buchanan* 2874 (HO); Rupert Point, *W.D. Jackson*, Jan. 1954 (HO); South Arm, River Derwent, *S. Paswanja*, (?)Sept. 1938 (NSW).

New Guinean and Pacific island species of *Leptecophylla*

Leptecophylla also includes seven species distributed in New Guinea and through the Pacific. Detailed examination of these species was beyond the scope of this study and consequently descriptive treatments and full synonymy for these species is omitted. A limited number of specimens of the first three species were examined as well as type material of all species. New combinations are given for these species, accompanied by type and distribution information, some taken from Sleumer (1963):

Leptecophylla brassii (Sleum.) C.M.Weiller, *comb. nov.* *Styphelia brassii* Sleum., *Blumea* 12: 160 (1963). *Type citation*: Mt Maneao, 2750-2855 m, *Brass* 22274 (holotype L *n.v.*; isotypes A *n.v.*, CANB, LAE *n.v.*). Restricted to New Guinea.

Leptecophylla imbricata (Stschegl.) C.M.Weiller, *comb. nov.* *Cyathodes imbricata* Stschegl., *Bull. Soc. Nat. Moscou* 32: i 10 (1859). *Type citation*: Insulae Sandvicenses [Mauna Kea], *D. Douglas* 19 (holotype LE *n.v.*; isotypes G *n.v.*, K).

Cyathodes douglasii A.Gray, *Proc. Am. Acad.* 5: 325 (1861). *Type citation*: Mauna Kea, *Douglas s.n.* (lectotype GH, *vide* H. Sleumer (1963), *Blumea* 12: 157). *Styphelia douglasii* (A.Gray) F.Muell. ex Skottsberg, *Act. Hort. Gothob.* 2: 255 (1925). Hawaii, Molokai, Maui, and Kauai.

Leptecophylla tameiameiae (Cham. & Schldl.) C.M.Weiller, *comb. nov.* *Cyathodes tameiameiae* Cham. & Schldl., *Linnaea* 1: 539 (1826). *Type citation*: in clivis aridioribus ad radices montium circa Hana-ruru [Honolulu] insulae O-Wahu [Oahu], *Eschscholtz* (holotype LE *n.v.*; isotypes B *n.v.*, G *n.v.*, K, L *n.v.*, P *n.v.*). *Styphelia tameiameiae* (Cham. & Schldl.) F.Muell., *Fragm.* 6: 55 (1867). Hawaiian and Marquesas Islands.

Leptecophylla pomarae (A.Gray) C.M.Weiller, *comb. nov.* *Cyathodes pomarae* A.Gray, *Proc. Am. Acad.* 5: 324 (1862). *Type citation*: Society Islands, on the mountains of Tahiti, U.S. Expl. Exp., *Pickering s.n.* (holotype GH *n.v.*; isotypes K, NY *n.v.*). *Styphelia pomarae* (A.Gray) Moore, *Bern. P. Bish. Mus. Bull.* 102: 36 (1933). Tahiti, Society Islands.

Leptecophylla rapae (Sleum.) C.M.Weiller, *comb. nov.* *Styphelia rapae* Sleum. *Blumea* 12: 159 (1963). *Type citation*: Tubai Is. Rapa I.: Kaimura mountain ridge, hillside near sea, 7-30 m, fl. fr. 6-11-1921, *Stokes* 421 (holotype BISH). Rapa Island, Tubai Islands.

Leptecophylla brevistyla (J.W.Moore) C.M.Weiller, *comb. nov.* *Styphelia brevistyla* J.W.Moore. *Bull. Bern. P. Bish. Mus.* 102: 36 (1933). *Type citation*: Temehani plain, [Raiatea], 470 m, 21 Sept. 1926, *J.W. Moore* 106 (holotype BISH, isotypes BISH). Society Islands.

Leptecophylla mariannensis (Kaneh.) C.M.Weiller, *comb. nov.* *Cyathodes mariannensis* Kaneh., *Bot. Mag. Tokyo* 48: 734, f. 5 (1934). *Type citation*: Aramagan I., Marianne Islands, July 6 1933, *Kanehira* 2182 (holotype FU *n.v.*; isotypes K, P *n.v.*). *Styphelia mariannensis* (Kaneh.) Kaneh. & Hatus., *Bot. Mag. Tokyo* 56: 484, in text (1942). Marianas.

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